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Gavin N. Manning, Esq.
OYEN WIGGS GREEN & MUTALA
480-The Station
601 West Cordova Street
Vancouver, British Columbia, V6B 1G1
CANADA

EXAMINER

KIM, RICHARD H

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 11/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/835,543

Applicant(s)

RICHARDSON, DOUGLAS

Examiner

Richard H Kim

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 17-49 is/are pending in the application.
- 4a) Of the above claim(s) 5-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 17-49 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 46 and 49 are rejected under 35 U.S.C. 102(b) as being anticipated by Welch et al. (US 5,255,332).

Referring to claim 1, Welch et al. discloses a method comprising focusing a selected input light beam on a first selective optical switching element, the first selected reflected optical element directing the selected input light beam to a first output (see col. 4, lines 13-31); selecting a second reflective optical switching element (see col. 4, lines 13-31); and focusing (see col. 3, line 5) the selected input light beam on the selected reflective optical switching element, the second selective reflective optical element directing the selected input light beam to a second output (col. 5, lines 24-45).

Referring to claim 46, Welch et al. discloses a method comprising actuating a reflective element corresponding to the selected input and output channels (see col. 2, lines 31-55); and focusing an optical signal from the selected input channel onto the actuated reflective element (see col. 3, lines 4-6).

Referring to claim 49, Welch et al. discloses a method comprising focusing a selected radiation beam on a first selected on a first selected reflective optical switching element (see col.

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2, lines 31-54); selecting a second reflective optical switching element; and focusing the selected radiation beam on the second reflective optical switching element (see col. 5, lines 24-49)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 4, 17, 19, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Welch et al. (US 5,255,332) in view of Winarski et al. (US 6,317,190 B1).

Referring to claims 2, 4, 17, 19 and 23, Welch et al. discloses the method previously recited. Welch et al. further discloses the method of focusing an optical signal along optical path between the fiber and the switching element (see col. 3, lines 4-10). However, the reference does not disclose that focusing comprises varying a focal length of an adaptive optical element, comprising a variable lens.

Winarski discloses a method of varying a focal length of an adaptive optical element comprising a variable lens (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to vary the focal length of an adaptive focusing element comprising a variable lens since one would be motivated to improve the precision of the device. By having the focal length varied by the adaptive focusing element, the optical signal can be precisely coupled to the selected switching element, reducing coupling loss between the optical fiber and

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the switching element. Further, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the adaptive optical element comprise a variable lens in order the focal length to be varied without having to replace the lens to match the focal length corresponding to a selected reflective switching element. Moreover, it has been held that the provision of adjustability, where needed, involves only routine skill art. *In re Steven*, 101 USPQ 284 (CCPA 1954).

Referring to claim 21, Welch et al. and Winarski et al. disclose the device previously recited. Welch et al. further discloses an optical crossbar switch comprising at least one optical element having a focal length (see col. 3, lines 4-9), the optical element located in a path of a selected input light beam (see Fig. 1, ref. 19, 21, 23, 15) and a plurality of selectable reflective optical elements (see Fig. 1, ref. 17), the selectable reflective optical elements alternatively selectable and interdisposable in the path of the selected input light beam to direct the selected light beam to a corresponding one of a plurality of outputs (see col. 4, lines 14-31); and wherein more than one of the selectable reflective optical elements are located within the range over which the adaptive optical element is capable of focusing the selected input light beam (see Fig. 1, ref. 17). However, the reference does not disclose the switch comprising at least one adaptive optical element having a focal length variable over a range.

Winarski et al. discloses at least one adaptive optical element having a focal length variable over a range (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have at least one adaptive optical element having a focal length variable over a range since one would be motivated to improve the precision of the device. By having the

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focal length varied by the adaptive focusing element, the optical signal can be precisely coupled to the selected switching element, reducing coupling loss between the optical fiber and the switching element. Further, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the adaptive optical element comprise a variable lens in order for the focal length to be varied without having to replace the lens to match the focal length corresponding to a selected reflective switching element. Moreover, it has been held that the provision of adjustability, where needed, involves only routine skill art. *In re Steven*, 101 USPQ 284 (CCPA 1954).

5. Claims 3, 18 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Welch et al. and Winarski et al., in view of Nishikawa et al. (US 5,498,868).

Welch et al. and Winarski et al. disclose the method previously recited. However, the references do not disclose the method comprising a variable mirror device.

Nishikawa et al. discloses a variable focus mirror whose focal length continuously changes (see col. 4, lines 36-40).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the adaptive optical element comprise of a variable mirror device since such a modification would enable the focal length to be varied without having the replace the mirror to correspond with the position of a selected reflective switching element. Further, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the adaptive optical element comprise of a variable mirror device since such a

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modification would increase the versatility of the device since the mirror can also act as a directional guide for the input light beam.

6. Claims 20 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Welch et al. and Winarski et al. in view of Silver (US 6,188,525 B1).

Welch et al. and Winarski et al. disclose the method previously recited. However, the references do not disclose that the variable lens comprising a variable micro-machined membrane lens.

Silver discloses a variable membrane lens (see abstract). Winarski et al. discloses a micro-machined mirror (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a micro-machined membrane lens in order to minimize the size of the mirror therefore simplifying the overall apparatus by minimizing the size of the device.

7. Claims 25-26, 30-34, 37-39, and 43-45, 47-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Welch et al. in view of Winarski et al.

Referring to claim 25, Welch et al. discloses an apparatus comprising a plurality of individually switching reflective elements located to intercept an optical signal from an input channel (see Fig. 1, ref. 17), the plurality of reflective elements having a plurality of selectable configurations (see col. 2, lines 50-51), each of the configurations directing the optical signal to a corresponding one of the output channels (see col. 2, lines 31-44), in each of the configurations the optical signal incident on a selected one of the reflective elements (see col. 2, lines 31-54);

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and a focusing optical element in an optical path between the input channel and the plurality of reflective elements and configured to direct the optical signal to a selected reflective element (see col. 3, lines 4-6). However, the reference does not state that the focusing optical element is adjustable.

Winarski et al. discloses an adjustable focusing optical element (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the focusing element adjustable, since it has been held that the provisions of adjustability, where needed involves only routine skill in the art. *In re Steven*, 101 USPQ 284 (CCPA 1954). Further, such a modification would improve the precision of the device. By having the focal length adjustable, the optical signal can be precisely coupled to the selected switching element, reducing coupling loss between the optical fiber and the switching element.

Referring to claim 26, Welch et al. discloses an apparatus wherein each of the plurality of reflective elements corresponds to one of the plurality of output channels and in each of the configurations the selected one of the reflective elements in the reflective element corresponding to the corresponding output channel (see col. 2, lines 31-54).

Referring to claim 30, Welch et al. and Winarski et al. disclose the device previously recited. However, Welch et al. does not disclose the device wherein the adjustable focus optical element comprises of either an adjustable focus reflective elements or and adjustable focus transmissive element.

Winarski et al. discloses an adjustable focusing optical element (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have an adjustable focus transmissive element, since it has been held that the provisions of adjustability, where needed involves only routine skill in the art. *In re Steven*, 101 USPQ 284 (CCPA 1954). Further, such a modification would improve the precision of the device. By having the focal length adjustable, the optical signal can be precisely coupled to the selected switching element, reducing coupling loss between the optical fiber and the switching element.

Referring to claim 31, Welch et al. and Winarski et al. disclose the device previously recited. Welch et al. further discloses a plurality of focus second optical elements each located in an optical path between the plurality of reflective elements and a corresponding one of the output channels (see col. 3, lines 4-13). However, the references do not disclose that the focusing elements are adjustable.

Winarski et al. discloses an adjustable focusing optical element (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the focusing element adjustable, since it has been held that the provisions of adjustability, where needed involves only routine skill in the art. *In re Steven*, 101 USPQ 284 (CCPA 1954). Further, such a modification would improve the precision of the device. By having the focal length adjustable, the optical signal can be precisely coupled to the selected switching element, reducing coupling loss between the optical fiber and the switching element.

Referring to claim 32, Welch et al. discloses an apparatus comprising a plurality of collimating lens, each of the collimating lens disposed in an optical path between one of the plurality of second optical elements and a corresponding output channel (see col. 3, lines 4-13).

Referring to claim 33, Welch et al. discloses an apparatus comprising a collimating lens disposed between the input channel and the at least one adjustable focus optical element (see col. 3, lines 4-13).

Referring to claim 34, Welch et al. discloses an apparatus wherein the input channel comprises an optical fiber (see Fig. 1, ref. 13 and 15).

Referring to claim 37, Welch et al. and Winarski et al. disclose the device previously recited. However, the Welch et al. does not disclose that the adjustable focus optical element comprises a liquid crystal lens.

Winarski et al. discloses an adjustable focus optical element comprising a liquid crystal lens (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the adjustable focus optical element comprise a liquid crystal lens since one would be motivated to maximize the range of adjustability of the device. According to Winarski et al., such a lens provides “greater focal length range”, thereby improving the versatility of the device.

Referring to claim 38, Welch et al. discloses an apparatus comprising a plurality of optical input channels and a plurality of optical output channels (see Fig. 1, ref. 13 and 15); a plurality of individually reflective switchable reflective elements, each of which is switchable between a reflecting state and a non-reflecting state (see col. 2, lines 50-51); and a plurality of

focus optical elements (see col. 3, lines 4-6) in an optical path between a corresponding one of the input optical channels and the plurality of individually switchable reflective elements (see Fig. 2, ref, 19, 21,23,25), each of the focus optical elements capable of focusing an optical signal from the corresponding one of the input channels onto a switchable reflective element; wherein an optical signal may be directed from a selected one of the input optical channels to a selected one of the output optical channels by switching a selected one of the plurality of reflective elements to its reflecting state and focus the optical signal onto a selected reflective element (see (see col. 3, lines 4-6; col. 2, lines 31-54). However, the reference does not disclose that the focusing optical element is adjustable.

Winarski et al. discloses an adjustable focusing optical element (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the focusing element adjustable, since it has been held that the provisions of adjustability, where needed involves only routine skill in the art. *In re Steven*, 101 USPQ 284 (CCPA 1954). Further, such a modification would improve the precision of the device. By having the focal length adjustable, the optical signal can be precisely coupled to the selected switching element, reducing coupling loss between the optical fiber and the switching element.

Referring to claim 39, Welch et al. discloses a method comprising actuating a reflective elements to direct an optical signal from an input channel to a selected one of the output channels (see col. 5, lines 24-49); and a focusing optical element to focus the optical signal from the input channel onto the reflective element (see col. 3, lines 4-6). However, the reference does not disclose that the focusing optical element is adjustable.

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Winarski et al. discloses an adjustable focusing optical element (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the focusing element adjustable, since it has been held that the provisions of adjustability, where needed involves only routine skill in the art. *In re Steven*, 101 USPQ 284 (CCPA 1954). Further, such a modification would improve the precision of the device. By having the focal length adjustable, the optical signal can be precisely coupled to the selected switching element, reducing coupling loss between the optical fiber and the switching element.

Referring to claim 43, Welch et al. and Winarski et al. disclose the method previously recited. Welch et al. further discloses a method comprising providing a second focus optical element in an optical path between the reflective element and the selected one of the output channels to couple to the selected one of the output channels (see col. 3, lines 4-6 and col. 2, lines 31-54). However, the reference does not disclose that the focusing element is adjustable.

Winarski et al. discloses an adjustable focusing optical element (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the focusing element adjustable, since it has been held that the provisions of adjustability, where needed involves only routine skill in the art. *In re Steven*, 101 USPQ 284 (CCPA 1954). Further, such a modification would improve the precision of the device. By having the focal length adjustable, the optical signal can be precisely coupled to the selected switching element, reducing coupling loss between the optical fiber and the switching element.

Referring to claim 44, Welch et al. and Winarski et al. disclose the method previously recited. Welch et al. further discloses a method of deactivating the reflective element and activating a different reflective element (see col. 2, lines 31-54). However, the reference does not disclose adjusting the focus optical element to focus the optical signal onto the different reflective element.

Winarski et al. discloses an adjustable focusing optical element (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the focusing element adjustable, since it has been held that the provisions of adjustability, where needed involves only routine skill in the art. *In re Steven*, 101 USPQ 284 (CCPA 1954). Further, such a modification would improve the precision of the device. By having the focal length adjustable, the optical signal can be precisely coupled to the selected switching element, reducing coupling loss between the optical fiber and the switching element.

Referring to claim 45, Welch et al. discloses a method wherein activating a different reflective element comprises switching the different reflective element from a non-reflective state to a reflecting state (see col. 2, lines 50-51).

Referring to claim 47, Welch et al. discloses the method previously recited. Welch et al. further discloses a method wherein focusing an optical element signal from a selected channel onto the reflective element comprises a focus optical element (see col. 3, lines 4-6) disposed in an optical path between the selected input channel and the reflective element (see Fig. 1, ref. 19,21,23,35). However, the reference does not disclose that the focusing is adjustable.

Winarski et al. discloses an adjustable focusing optical element (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the focusing element adjustable, since it has been held that the provisions of adjustability, where needed involves only routine skill in the art. *In re Steven*, 101 USPQ 284 (CCPA 1954). Further, such a modification would improve the precision of the device. By having the focal length adjustable, the optical signal can be precisely coupled to the selected switching element, reducing coupling loss between the optical fiber and the switching element.

Referring to claim 48, Welch et al. and Winarski et al. disclose the method previously recited. Welch et al. further discloses a method comprising a second focus optical element disposed in an optical path between the reflective element and the selected output channel to couple the optical signal to the selected output channel (see Fig. 1, ref. 19, 21, 23, 25).

However, the reference does not disclose that the focusing is adjustable.

Winarski et al. discloses an adjustable focusing optical element (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the focusing element adjustable, since it has been held that the provisions of adjustability, where needed involves only routine skill in the art. *In re Steven*, 101 USPQ 284 (CCPA 1954). Further, such a modification would improve the precision of the device. By having the focal length adjustable, the optical signal can be precisely coupled to the selected switching element, reducing coupling loss between the optical fiber and the switching element.

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8. Claims 27-29, 35-36 and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Welch et al. and Winarski et al., in view of Little et al. (US 6,430,333 B1).

Referring to claims 27-28 and 40-41, Welch et al. and Winarski et al. disclose the device and method previously recited. However, the references do not disclose that the plurality of individually switchable reflective elements comprise moving the reflective element between a position wherein the reflective element is in a non-reflecting state to a position wherein the reflective elements is in a reflecting state and wherein the member is moveable between a substantially flat orientation and a substantially upright orientation and when the reflective element is in its reflecting state, the elements is in its substantially upright orientation.

Little et al. discloses a device wherein a plurality of individually switchable reflective elements comprise a member moveable between a substantially flat orientation and a substantially upright orientation and when the reflective element is in its reflecting state, the elements is in its substantially upright orientation (see Fig. 1b).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to move the reflective element between a position wherein the reflective element is in a non-reflecting state to a position wherein the reflective elements is in a reflecting state and wherein the member is moveable between a substantially flat orientation and a substantially upright orientation and when the reflective element is in its reflecting state, the elements is in its substantially upright orientation since such a modification would act to enable an optical elements to be switched from a reflective state and a non-reflective state, and therefore, would not have altered the primary function of the invention of Welch et al.

Referring to claims 29, 35-36, and 42, Welch et al. and Winarski et al. disclose the device and method previously recited. Welch et al. further discloses an apparatus wherein the plurality of individually switchable reflective elements comprise a linear array of reflective elements (see Fig. 1); and wherein the plurality of linear arrays include a reflective element corresponding to each possible combination of one of the input channels and one of the output channels (see col. 2, lines 31-44). However, the references do not disclose that each of the plurality of individually switchable reflective elements comprise a micro-machined mirror.

Little discloses a plurality of switchable reflective elements comprising a micro-machined mirror (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the elements comprise a micro-machined mirror since one would be motivated to minimize the size of the mirror in order to simplify the device by minimizing the overall size of the device.

Response to Arguments

9. Applicant's arguments filed 23 August 2002 have been fully considered but they are not persuasive. In response to applicant's argument that the Welch et al. does not teach focusing a selected input light beam on a first switching element and then focusing the selected input light beam on a second switching element, Examiner maintains his rejection on the basis that the Welch et al. reference clearly discloses an optical focusing element to focus select input light beam on a first selected switching element and then focusing the selected input light beam on a second switching element (see col. 3, lines 4-6; col. 5, lines 24-49).

10. Applicant's arguments with respect to claim 1-4 and 17-49 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard H Kim whose telephone number is (703)305-4791. The examiner can normally be reached on 8:30-5:00 M-F.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H Kim can be reached on (703)305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7722 for regular communications and (703)308-7724 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Richard H Kim
Examiner
Art Unit 2882

RHK
October 30, 2002


ROBERT H. KIM
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2000